RADIO RESOURCE ALLOCATION FOR PROXIMITY SERVICES

FIELD

[0001] The present invention relates to radio resource allocation for proximity services. More specifically, the present invention exemplarily relates to measures (including methods, apparatuses and computer program products) for realizing radio resource allocation for proximity services.

BACKGROUND

[0002] The present specification generally relates to preparation of proximity services, in particular to negotiation, between an end entity and a network, of conditions for proximity services.

[0003] It is worked (e.g. 3rd Generation Partnership Project (3GPP)) on techniques that enables direct discovery between user equipments (UE), i.e. UE-UE discovery, and UE-UE communication over Long Term Evolution (LTE) radio interface (also known as proximity services). Such proximity services may be used for example for public safety communication over LTE radio. Another possible exemplary application may be commercial discovery and communication.

[0004] In order to avail proximity services, UE(s) need to obtain authorization from the network for availing radio resources. Two types of resource allocation mechanisms are known from RAN2 specification regarding radio resource allocation for proximity services (ProSe) direct discovery announcing.

[0005] According to a first type of resource allocation for discovery information announcement, a resource allocation procedure where resources for announcing of discovery information are allocated on a non UE specific basis is described such that an evolved NodeB (eNB) provides the UE(s) with a resource pool configuration used for announcing of discovery information. The configuration may be signaled in a system information block (SIB). Then, a respective UE autonomously selects radio resource(s) from the indicated resource pool and announces discovery information. The UE can announce discovery information on a randomly selected discovery resource during each discovery period.

[0006] According to a second type of resource allocation for discovery information announcement, a resource allocation procedure where resources for announcing of discovery information are allocated on per UE specific basis is described such that a UE in RRC_CONNECTED may request resource(s) for announcing of discovery information from the eNB via radio resource control (RRC). The respective eNB assigns resource(s) via RRC. The resources are allocated within a resource pool that is configured in UEs for monitoring. For UEs in RRC_IDLE, the respective eNB may, on the one hand, provide a resource pool according to the first type described above for discovery information announcement in SIB. UEs that are authorized for ProSe direct discovery may use these resources for announcing discovery information in RRC_IDLE. On the other hand, the eNB may indicate in SIB that it supports device to device (D2D) but does not provide resources for discovery information announcement. UEs need to enter RRC_CONNECTED in order to request D2D resources for discovery information announcement. Once a UE authorized to perform ProSe direct discovery announcement entered RRC_CONNECTED, it indicates to the eNB that it wants to perform D2D discovery announcement.

[0007] The UE non-access stratum (NAS) layer is the trigger to initiate radio resource allocation for D2D discovery and communication.

[0008] According to a both types of resource allocation for discovery information announcement, there is a need for the respective UE to initiate a service request (SR) procedure to transfer the UE to ECM_CONNECTED mode to enable UE RRC layer to send discovery indication to eNB for RRC connection establishment.

[0009] In particular, the UE sends a service request that results in a data radio bearer (DRB) establishment although UE does not need the DRB for any purpose in this case, i.e., although the UE has no uplink data to be sent to the network.

[0010] Hence, the problem arises that an unnecessary use of radio resources and core network resources are raised to enable D2D discovery and communication, although only a signaling radio bearer (SRB) is needed to enable authorization of radio resources use for direct discovery and communication.

[0011] Further, according to the known service request procedure, the only indication of successful completion of the service request procedure to the UE is the establishment of radio access bearers (RAB) before expiry of a timer T3417/T3417ext. If the RABs establishment is unsuccessful before the UE NAS layer timer for SR times out, then it considers that the procedure has failed and takes necessary action (i.e. repeats SR, informs upper layer or other implementation specific actions).

[0012] Hence, the further problem arises that an unnecessary (fully) blown SR procedure is used although only a resource allocation for discovery information announcement is demanded.

[0013] Thus, there is a strong desire for an optimized procedure for D2D in 3GPP.

[0014] Hence, there is a need to provide for radio resource allocation for proximity services, and in particular, for an optimized procedure/behavior for radio resource allocation for proximity services.

SUMMARY

[0015] Various exemplary embodiments of the present invention aim at addressing at least part of the above issues and/or problems and drawbacks.

[0016] Various aspects of exemplary embodiments of the present invention are set out in the appended claims.

[0017] According to an exemplary aspect of the present invention, there is provided a method comprising transmitting a radio resource control connection establishment request indicative of a demand of a proximity service, receiving a radio resource control connection setup message including information indicative of radio resources allocated for said proximity service, and deciding, whether said radio resources are authorized, based on said receiving of said radio resource control connection setup message.

[0018] According to an exemplary aspect of the present invention, there is provided a method comprising receiving a radio resource control connection establishment request indicative of a demand of a proximity service, allocating radio resources for said proximity service, and transmitting a radio resource control connection setup message including information indicative of said radio resources.